

DOCUMENT RESUME

ED 190 125

IR 008 617

AUTHOR Seabrook, Richard H. C.  
TITLE The Channel Establishment Problem.  
PUB DATE 17 May 80  
NOTE 10p.: Paper presented at the American Society for  
Information Science Mid-Year Meeting (Pittsburgh, PA,  
May 17, 1980).  
  
EDRS PRICE MF01/PC01 Plus Postage.  
DESCRIPTORS Communications: \*Information Retrieval: \*Information  
Theory: \*Models: \*Probability: \*Telecommunications  
IDENTIFIERS \*Communication Channels

ABSTRACT

Understanding of the communications process centers generally around the conduct of the process rather than the content, and particularly the establishment of communication channels. The communications model has three generally agreed upon components: source, channel, and destination. Destination may include questions about the nature of things, their theories, speculations and opinions, exhibits and data, experimental results, models, and interpretations. Sources provide the information required to respond to these questions. Once destination and sources are identified, it is necessary to connect them with one or more appropriate communication channels. The probability of successful establishment of a channel is the composite product of: (1) the probability that a destination asks the right question; (2) the probability that the destination selects the right channel; (3) the probability that the source selects the right channel; and (4) the probability that the source provides the right information. The usefulness of this notion needs further investigation to determine its value in reflecting what happens in the communications process or predicting what might occur. (RAA)

\*\*\*\*\*  
\* Reproductions supplied by EDRS are the best that can be made \*  
\* from the original document. \*  
\*\*\*\*\*

ED190125

U.S. DEPARTMENT OF HEALTH,  
EDUCATION & WELFARE  
NATIONAL INSTITUTE OF  
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

THE CHANNEL ESTABLISHMENT PROBLEM

Richard H. C. Seabrook

PERMISSION TO REPRODUCE THIS  
MATERIAL HAS BEEN GRANTED BY

Richard C. Seabrook

TO THE EDUCATIONAL RESOURCES  
INFORMATION CENTER (ERIC)."

IR008617

## THE CHANNEL ESTABLISHMENT PROBLEM\*\*

Richard H.C. Seabrook  
Corporation for Public Broadcasting  
1111 16th Street, N.W.  
Washington, D.C.

### Introduction

As many of you are aware, we in SIG's TIS and FIS\* have been conducting a computerized conference for several years to discuss the nature of information, among other things. Those of you with experience in communications systems of this type realize, I'm sure, the tendency of such discussions to wander rather far afield. Perhaps for this reason and the multiple interests of our collection of participants, I must report that we haven't gotten very far.

We have deliberated at various times over the kinds of models appropriate to the communications process, pondered over sub-processes such as thinking and understanding, speculated as to the role of truth, belief and faith, and many other concepts as well. All of this is good and useful work, I feel, and valuable to us individually. However, few final agreements have been reached.

What may be as important, ultimately, for our understanding of the communication process, and the subject of my discussion today, centers around the conduct of the deliberation process rather than its content. In particular I will consider the problem of channel establishment.

\*Special Interest Groups on Technology, Information and Society, and Foundations of Information Science of the American Society for Information Science.

\*\*Presented at ASIS 1980 Mid-Year Meeting, Robert Morris College, Pittsburgh, Pennsylvania, May 17, 1980.

### Communications Model

The general model of the communications process has been depicted by many authors as having three basic components: source, channel, and destination (many different terms and labels have been applied to the components over the several-thousand years of its use). See Figure 1. It is generally agreed that this model includes all the entities required for a communications act to take place. Many authors have gone forward from this point to speculate on the various attributes and sub-processes in the components which are evident during events where information transfer is assumed to have taken place. Computer conferencing itself is describable using this model as a fundamental building block and as an aggregate of many lesser activities.

We've noted that from time-to-time the communications process illustrated by this model takes a while to set up: in such cases a considerable amount of activity has been required to determine that group of individuals capable and willing to take part in a discussion, to establish some common ground--an agreed upon language and set of definitions--as a basis for discussion, and similar preliminary activities. This observation has lead us to speculate on whether or not such preliminary activities are required for the establishment of any communications process and why. If universally required, such initialization chores would argue for the inclusion of a time-phase relationship in the communications model.

Such relationships are not unusual in information systems. Virtually all computer procedures must be initialized in order to run properly, telecommunications channels require certain protocols to be executed to establish transmission sequencing and rates, codes, etc., people need to be introduced to each other before they can begin to converse in a meaningful way, and complicated interactions like chess games are understood to have general phases denoted "opening", "mid-game" and "end-game". What these phases represent is a subtle shift in the approaches and tactics to be applied at various points in time due to certain agreed-upon conditions having been reached.

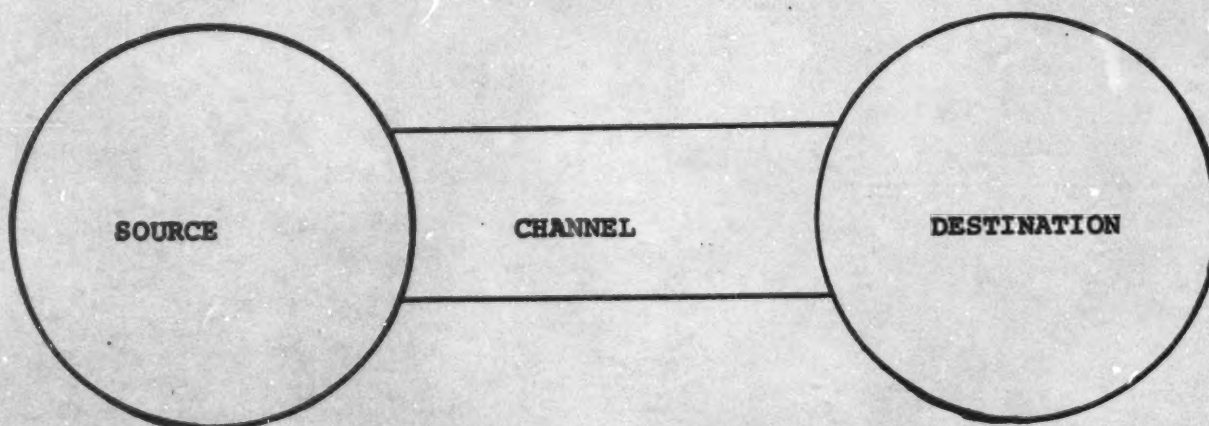


Figure 1 4

### Attention (selectivity)

Most preliminary activities seem to have something to do with attention and selection--the narrowing down of a wide number of alternative values, views, definitions, participants and so on into a relatively smaller number with which one feels competent to deal on a longer term basis. If the communications process requires such a preliminary phase, what kinds of activities is it likely to contain? To answer this let's look more closely at the entities involved as they begin to set up the structure illustrated by the general model. With your permission I will use myself as the interested agent for descriptive purposes.

### Destination

As I come into the communications process I may find that I have a number of things I desire to know something about. See Figure 2. For example, I may have general questions on the nature of things. For these I may be looking for theories concerning the things I have in mind and their nature. Likewise I may be interested in speculations and opinions leading to the development of more rigorous concepts. For this purpose I may also want facts, data, exhibits and experimental results on which I can try out my preliminary ideas. At times I may want to know about other people's models and interpretations of processes and data, and so on. I know from experience that I am unlikely to find all such things in one place, and in the event that I can, there may be several such places which do not always agree.

#### DESTINATION

##### Questions about:

- The nature of things
- Theories on the natures of things
- Speculations and opinions
- Facts, exhibits
- Data
- Experimental results
- Models
- Interpretations

Figure 2

In order to arrive at meaningful questions I must boil down all these needs as much as I can and be as specific as possible about my vague requirements. Fortunately this is often the way to proceed in any area in an orderly fashion. The process involved here is one of selection--choosing among many problems and parts of problems, any combination of which may have some relevance for the issue at hand. The selection of a few things from a great many things in the absence of clear and distinct rules for doing so generally is expressed in terms of probabilities--what is the likelihood of my generating meaningful questions from all the things I'd like to know?

#### Destination View

Having devised a beginning list of items my next task is to locate the place where I am likely to find them. As a destination my view of the world is that it contains a great many information sources associated with a somewhat smaller number of channels in ways that I can only guess. See Figure 3. To complicate matters I know that not all sources are available to me, that many sources are themselves interrelated in obvious and invisible ways, and that not all channels are unique, there being duplication and overlap in this as in many other systems. Again I must apply some selection process in order to come up with a set of channels through which to make my requests known.

#### DESTINATION VIEW

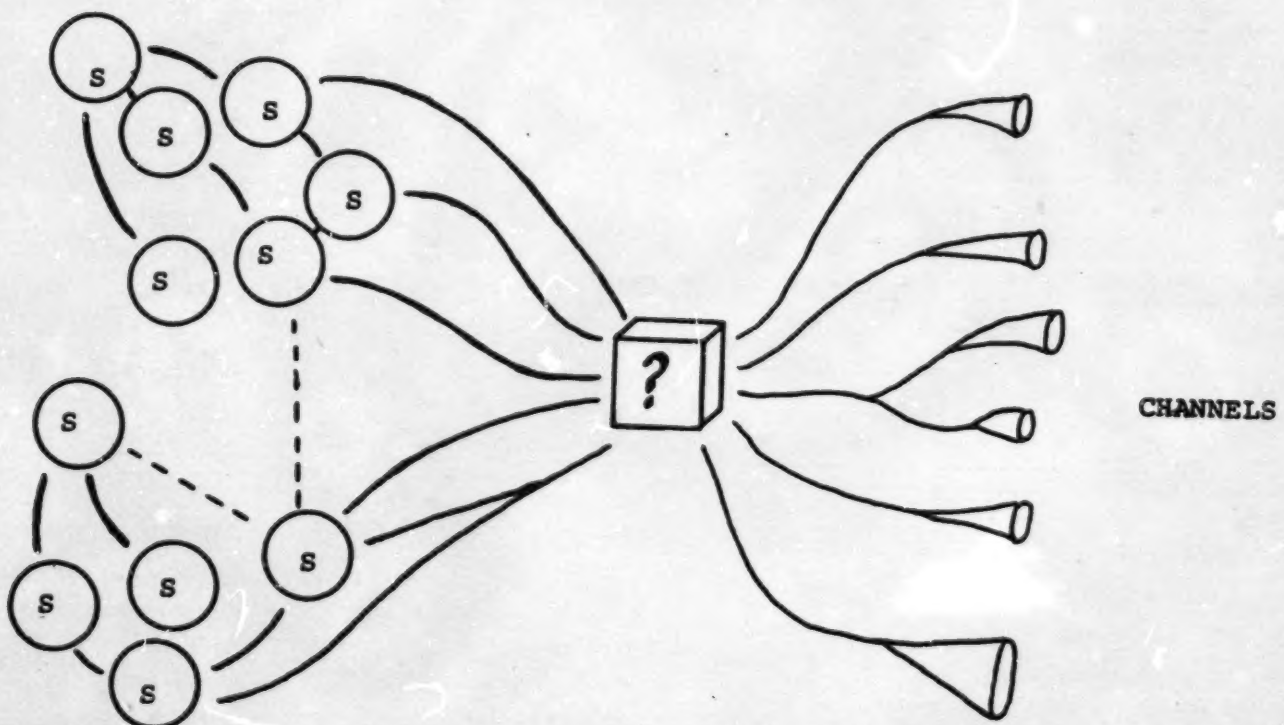


Figure 3

### Source View

Moving a step further up-stream in the communications model, I, as a source, view the world as containing a myriad destinations for information who are independent or related in obvious or subtle ways, and who are paying attention to an unknowable combination of information channels. See Figure 4. Having learned of a need for information on a particular topic I must select the proper combination of channels that will deliver it to its destination, a matter of probabilities once again.

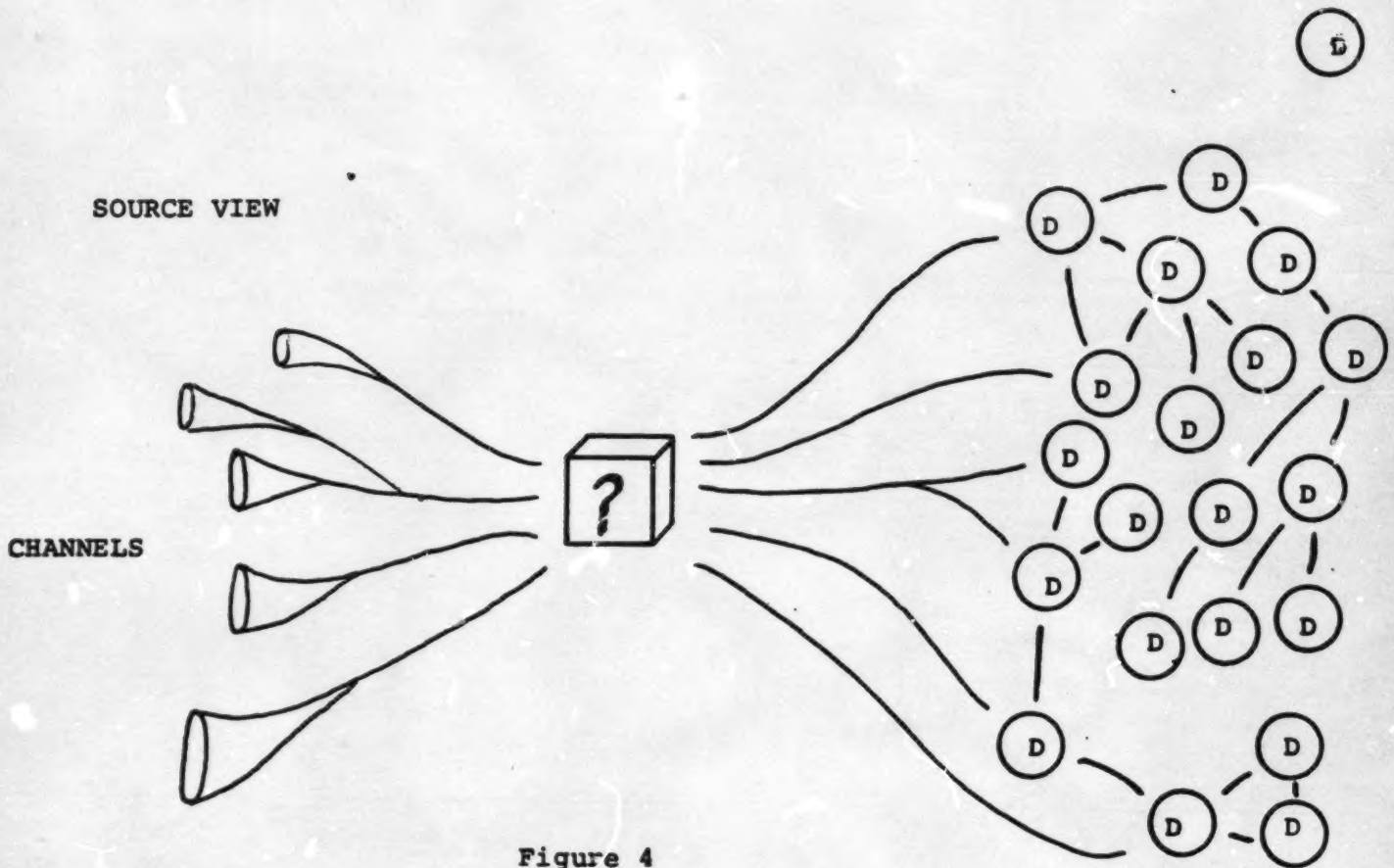


Figure 4

Source

As a source of information on a particular subject I am a purveyor of a variety of possible forms which may shed some light on the destination's problem. See Figure 5. For example, I may have facts, data, opinions, speculations, exhibits, experimental results, theories and interpretations. Not all of those are appropriate to an individual situation, and it's not always clear which ones are. My selection of the most suitable combination of informational forms has a certain probability associated with it.

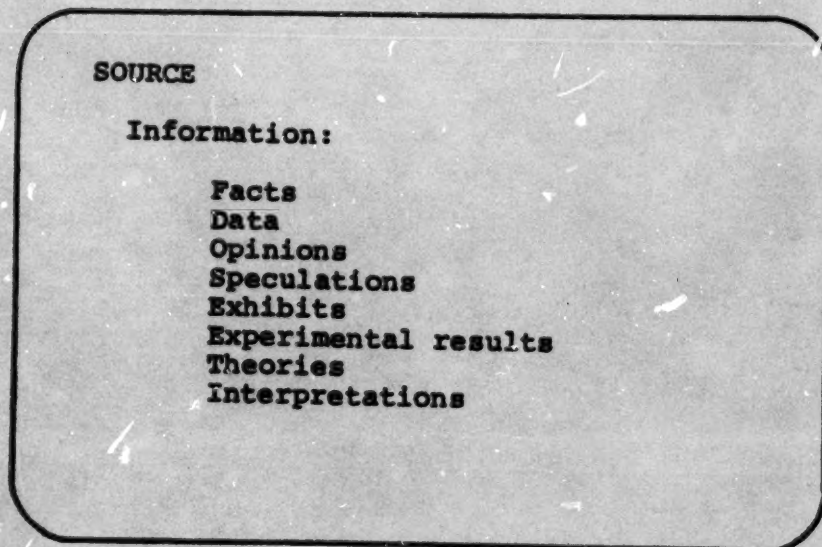


Figure 5

### Probability of Channel Establishment

For review, the successful establishment of an information channel may depend on the completion of several preliminary selection processes, each expressible in terms of probabilities:

- P<sub>q</sub>        -    The probability that a destination asks the right questions;
- P<sub>dc</sub>      -    The probability that the destination selects the right channel;
- P<sub>sc</sub>      -    The probability that the source of the information selects the right channel; and
- P<sub>i</sub>        -    The probability that the source provides the right information (or that the right source is selected.)

Without prior knowledge of any of the interrelationships among sources, channels and destinations to drive the selection process, the four probabilities are independent. Thus, the composite probability that the structure depicted in the general model will be created is the product of the four probabilities discussed above.

### Usefulness

The idea of a composite probability for channel establishment is appealing, but in order to be worth thinking about it ought to have some value in reflecting what happens in the communications process or predicting what may occur. While such examination is left for later work, a few speculations are in order. The division of sciences into sub-and sub-sub-disciplines and the emergence of computer-driven information retrieval systems

may be making it increasingly difficult to formulate the proper questions and select the correct source of information, decreasing  $P_q$  and  $P_i$ . The advent of many new information services makes channel selection more difficult, lowering  $P_{dc}$  and  $P_{sc}$ . The rising cost of doing almost anything in the world today is probably affecting the number of alternative channels to be selected from in various ways, not all of which may increase the composite probability.

#### A Final Observation

The set of preliminary selection tasks described above happens, in most cases, in a sequential fashion. The failure of an information channel to be established leads to repeating the selection process, at least back to the step that is likely to be the one which caused the failure. Computer conferencing systems, with their many aids to describing participants and the subject matter contained in messages, and due to their conversational nature permit selection and specification activities to take place almost continuously. Thus if the proper sources are participating, channels can be established and refined very quickly.